PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference NIS-1102-PCT	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/JP2004/011021	International filing date *(day/month/year)* 27 July 2004 (27.07.2004)	Priority date *(day/month/year)* 31 July 2003 (31.07.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant NISSAN MOTOR CO., LTD.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 06 February 2006 (06.02.2006)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 740 14 35	Authorized officer Yoshiko Kuwahara Telephone No. +41 22 338 90 90

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* see form PCT/ISA/210 (second sheet)	
Applicant's or agent's file reference see form PCT/ISA/220	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/JP2004/011021	27.07.2004	31.07.2003

International Patent Classification (IPC) or both national classification and IPC
H01M4/02, H01M4/08, H01M6/18

Applicant
NISSAN MOTOR CO., LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Wiedemann, E Telephone No. +49 89 2399-7542

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2004/011021

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23 1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ in written format

   ☐ in computer readable form

   c. time of filing/furnishing:

   ☐ contained in the international application as filed.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	8, 12, 16-30, 33
	No:	Claims	1-7, 9-11, 13-15, 31, 32, 34-43
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-43
Industrial applicability (IA)	Yes:	Claims	1-43
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1: US-B1-6 375 885 (LEDDY JOHNA ET AL) 23 April 2002 (2002-04-23)

D2: EP-A-0 858 120 (MITSUBISHI DENKI KABUSHIKI KAISHA) 12 August 1998 (1998-08-12)

D3: US 2002/018930 A1 (HAMANO KOUJI ET AL) 14 February 2002 (2002-02-14)

D4: EP-A-1 265 302 (HITACHI, LTD; SHIN-KOBE ELECTRIC MACHINERY CO. LTD) 11 December 2002 (2002-12-11)

2. Novelty

The subject-matter of claims 1-7, 9-11, 13-15, 31, 32 and 34-43 is not considered to be novel, Article 33 (1) and (2) PCT, for the following reasons:

Document D1 discloses a method for coating a surface with a magnetic composite material with distinctive properties due to graded density composites. Graded density layers are formed on electrodes with the density layers parallel to the electrode surface, meaning the density decreases or increases perpendicular to the electrode. Solutions containing polymers of different concentration are formed and are laminated as thin films on the surface of the electrode. The ion exchange polymer is adsorbed by the graded polymer films and shows also a graded density.

Document D2 discloses a paste like active material mixture containing polymers and an electrolytic solution, which is applied to e.g. a collector. A lithium containing electrolytic salt, graphite powder and a polymer are mixed to prepare the paste-like active material. The paste is applied to the metal foil using a doctor blade to a thickness of 100μm (embodiment 5). The distribution of the particulate polymer in the electrode showed a density gradient. Accordingly, the electrolytic solution in the electrode was distributed with different degrees of gelation and concentration over the thickness of the electrode.

Therefore, subject-matter of claims 1-7, 9-11, 13-15, 31, 32 and 34-43 is not considered to

be novel.

3. Inventive Step
The subject-matter of claims 1-43 is also not considered to be based on an inventive step, Article 33 (3) PCT,

3.1 The technical problem underlying the present application is considered to avoid depletion of Li-ions during charge or discharge at high current rate by applying a density gradient on the electrode.

3.2 The solution to the above mentioned problem is known in the prior art and solved there by electrodes as disclosed in D1 and D2.

3.3 The subject-matter of claims 8 and 12 is not considered as inventive because the documents do not explicitly mention a gradient of the electrolytic salt in combination with a laminated thin film structure. Nevertheless, D1 discloses laminated thin film structures and it is obvious that once the graded polymer is soaked with the electrolyte, the electrolyte will be graded along the thickness of the electrode either.

3.4 The subject-matter of claims 16, 22-24 is not considered as inventive because the prior art discloses thicknesses of active material layers of less than 100μm on an electrode. The explicit combination of gel-electrolyte, thin-film lamination and thickness is not disclosed in D2 but easily derivable from it.

3.5 The subject-matter of claims 18, 25-30 is not considered as inventive because printers are known in the prior art to apply layer of polymers.

3.6 The subject-matter of claims 19-21 is not considered as inventive because lamination of thin film structures to fabricate an electrode are known. The combination of gel-electrolyte and lamination of thin-film structures as such is not disclosed in the available prior art. Since the gel-electrolyte can be applied in second step to the graded polymer the subject-matter of respective claims is not considered to be inventive.

3.7 The subject-matter of claims 33 is not considered as inventive because it does not add inventive subject-matter to the present set of claims.